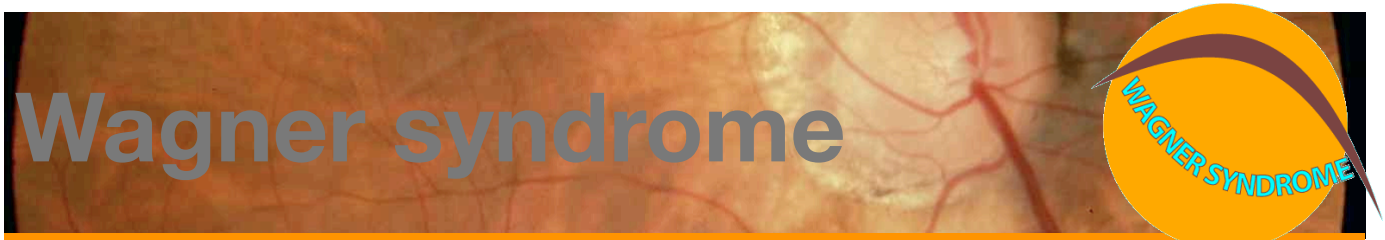

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Induced neuronal cells:
no need for induced puripotent stem cells?

Researchers have transformed ordinary mouse skin cells directly into neurons, bypassing the need for stem cells or even stemlike cells and greatly speeding up the field of regenerative medicine. The experiment could make it possible to someday take a sample of a patient's skin and turn the cells into a tailor-made transplant to treat brain diseases such as Parkinson's or Alzheimer's, or heal damaged spinal cords.

"This study is a huge leap forward," said Dr. Irving Weissman, director of the Institute for Stem Cell Biology and Regenerative Medicine at Stanford University in California, where the work was done and where it has been patented. Although they worked with mice, past stem cell accomplishments have been replicated in humans within months. The researchers also hope they can reprogram ordinary cells into other cell types to help replace damaged livers, treat diabetes and treat cancer.

Writing in the journal Nature, the researchers said they used just three genes to transform ordinary mouse skin cells directly into nerve cells called neurons. They are calling the new cells "induced neuronal cells". "We actively and directly induced one cell type to become a completely different cell type," said Dr. Marius Wernig of Stanford, who led the study. "These are fully functional neurons. They can do all the principal things that neurons in the brain do."
Wernig said he was surprised at his team's success. Scientists had thought they would have to make cells regress to a more primitive state before they could make them change direction. "To be very honest, I wasn't sure if it would work. It was one of those high-risk, high reward projects," Wernig said in a telephone interview. "It worked out, actually relatively quickly."
The team is already trying the same thing with human cells but Wernig says it appears to be a little trickier.

Efforts to do this kind of thing have focused on human embryonic stem cells, which retain the ability to become any kind of cell in the body. But their use is controversial and restricted.
In recent years, scientists have also found a way to regress skin cells into embryonic-like cells called induced pluripotent stem cells.

This experiment skips all those intermediate steps and although it does not immediately mean there is no need to use embryonic stem cells, it suggests a way to bypass them.
One drawback to the new cells is that they do not proliferate well in the lab and do not live for as long as the more primitive stem cells. But Wernig said he believes it will be possible to transform skin cells into all types. "You just need to find the right transcription cocktail and you can turn anything you want into anything you want," he said.

Transcription factors are genes that tell other genes what to do. Every cell in the body contains the entire DNA map, known as the genome, but only certain genes operate in certain cells. The ultimate goal behind all stem cell research has been to find a way to instruct cells to do something different. Wernig said his team's experiment tells scientists which genes they need to activate to do this.

The new cells could be transplanted, or grown in the lab to study diseases.
But it may be possible to also activate these three genes in the body using a drug or some other method. "That would have fantastic implications," said Wernig. "In the brain, for example, when there is a stroke or some other kind of lesion, there is often an overproliferation of nerve cells called glial cells. If you could turn those into neurons it would be fantastic."

What is said in this article about brains can be also applicable for the retina: the retina can be seen as the far ends of the brain.

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